COMPONENT PART NOTICE

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P004 091	Military Family Counselling
P004 092	Primary Prevention and the Military or Where is the Broad Street Pump Now?
P004 093	The Psychologist as the Evaluator of Soldiers through Command Consultation: A Model of Family Systems Unit Consultation

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	P004 096	Federal Legislation Affecting Psychology: Trends for the Eighties
	P004 097	The Process of Regional Consultantship for Army Psychologists

DEPARTMENT OF THE ARMY
OFFICE OF THE SURGEON GENERAL
WASHINGTON, D.C. 20310

REPLY TO ATTENTION OF

DASG-PSC

AMEDD PSYCHOLOGY SYMPOSIUM, 1980

There were sixty-two registered military psychology attendees for this symposium. Non-registered military and civilian participants made the grand total of attendees approximately seventy-five for this five day conference.

The theme of the conference, "Looking Toward AMEDD Psychology in the Eighties", recognized the significant challenge which faces AMEDD Psychology as it realigns to better support the AMEDD mission in the decade of the eighties. Course objectives, designed to accomplish the spirit of the theme, were:

- To promote knowledge and understanding of the significant issues and problems facing the Army in the 1980's with which military psychology must be concerned.

- To devise innovative ways for AMEDD Psychology to meet the challenges and produce solutions to anticipated problems.

- To provide a forum for continuing education, exchange of new ideas, and maintenance of high levels of professional competence for military psychologists.

The presentations and discussions herein reflect the best thinking available to the course director in structuring a symposium which would accomplish the course objectives. It should be noted that the views and opinions expressed are those of the respective authors and do not necessarily represent those of the Surgeon General, Department of the Army, or the Department of Defense.

I encourage all AMEDD Psychologists to prepare personally and professionally for the challenges which must be met during the decade of the eighties. It is only with dedicated personal and professional preparation that AMEDD Psychology will be able to conserve the fighting strength.

This headquarters is deeply appreciative of LTC Fishburne, CPT Klusman, and all participants who generously contributed their talents and energies to the symposium.

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Proceedings of the AMEDD Psychology Symposium
27-31 October 1980, Walter Reed Army Medical Center

MALE AND FEMALE PERFORMANCE ON MILITARY RELATED TASKS

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Introduction

A few years ago the Human Engineering Laboratory (HEL) began a serious consideration of the implications of greater utilization of female personnel in the Army. One program was initiated to provide answers to more immediate and applied problems such as those relating to anthropometric considerations in equipment and weapons design and to considerations of strength capabilities required in operating and repairing various types of equipment or weapons.

Another program, which is the subject of this paper, was initiated to perform more basic investigations of performance variables which might have more subtle implications a little farther down the road. In this regard, we set forth to determine whether or not there exist sex differences in performance abilities in the more traditionally defined areas of behavior. Further, we sought to determine whether or not certain aspects of female soldier performance might be influenced by cyclical factors associated with the menstrual cycle.

Our first step was to conduct extensive literature searches in such disciplines as psychology, human factors, physiology, and women's studies. One result of these searches was the publication of two bibliographies, one dealing with sex differences in performance abilities (Hudgens & Torsani-Fatkin, 1980) and another dealing with menstrual influence on performance and with women in nontraditional occupations, including a very large section on women in the military

(Torsani-Fatkin & Hudgens, 1980). Each bibliography has about 1500 references, and both are available on request from us at the HEL. The other important result of the searches was our determining several performance areas for further study in our laboratory. Those which we have been able to start examining so far include: auditory thresholds, hand-steadiness, and risk-taking behavior.

Experiments on Auditory Thresholds

We chose to look at auditory thresholds first for several reasons. First, some investigators (e.g., Semczuk, Przesmycka, & Pomykalski, 1967) had reported finding sex differences and menstrually related shifts in hearing thresholds which were large enough to have serious implications for communications, for instance. These effects were similar to those reported elsewhere for other sensory thresholds (e.g., Diamond, Diamond, & Mast, 1972). Second, the issues of sex differences and possible menstrual influence were not settled since other investigators had reported their inability to find such effects or to find effects of the same magnitude or at all frequencies (e.g., McGuiness, 1972). Third, our laboratory was particularly well equipped for research in this area.

Table 1

HEARING THRESHOLD EXPERIMENTS

Experiment	Subject Groups	Test Sessions	Menstrual Cycle Phase	Test Tone Freq (Hz)	Test Ear
I	1. Males (N=8) 2. Females Pill (N=8) 3. Females Non-Pill (N=8)	Weeks 1. Initial Screening 2-9. Experimental Tests (once/week)	Risecycle (X-2) Pre Menses (X-1) Menses (X) Post Menses (X+1)	500 1000 2000 3000 4000 6000	1. Left 2. Right
II	As Above (N=11/Group)	As Above	As Above	As Above Plus 8000	As Above
III	1. Males (N=32) 2. Females Pill (N=5) 3. Females Non-Pill (N=21)	One Only	---	As Above	As Above (Orders Balanced)

The designs for our first three experiments are shown in Table 1. Hearing thresholds were obtained using standard clinical audiometers modified to shift the "normal" range by

30 dB in order to get test readings from subjects with better than normal hearing. In all three studies, we tested groups of men, women taking birth control pills, and normally cycling women not taking birth control pills. In Experiments I and II the subjects were tested nine times and in Experiment III only once. The cycle phases were defined by determining (from questionnaires) a menses test date during weeks 3-7 and counting forward or backward from there for the other phases. The test frequencies were 500-6000 Hz in Experiment I. 8000 Hz was added thereafter when we started using a different audiometer.

For the sake of brevity, where appropriate the results from some of the experiments are combined. In Table 2 results from Experiments I and II are combined. The men demonstrated worse hearing than the women's groups for the left ear which was always tested first, according to standard clinical practice.

Table 2

HEARING THRESHOLDS

EXPERIMENTS I AND II COMBINED

MEAN THRESHOLDS

GROUP	EAR	
	LEFT	RIGHT
MALES	34.9	30.5
FEMALES NON-PILL	30.6	30.9
FEMALES PILL	29.8	29.4

In Table 3 for Experiment III, it can be seen that this difference was the same for both ears when the order of presentation was counterbalanced. (Please note that a constant of 30 dB was added to all the figures shown for hearing thresholds. Actual clinical readings would have been 30 dB lower, indicating essentially "normal" hearing for all groups.)

Table 3

HEARING THRESHOLDS

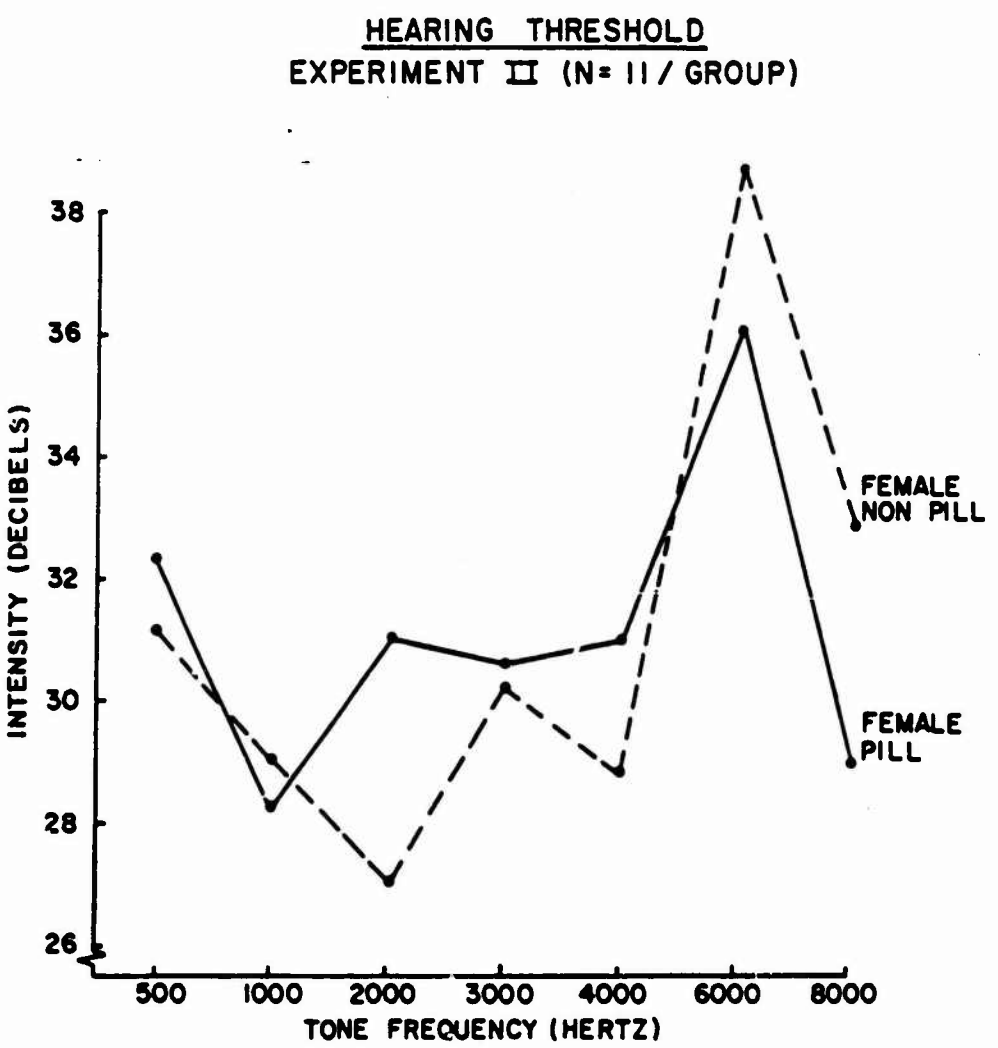
EXPERIMENT III

MEAN THRESHOLDS

GROUP	EAR	
	LEFT	RIGHT
MALES	36.6	35.6
FEMALES NON-PILL	32.8	32.5
FEMALES PILL	30.1	29.8

A significant interaction effect was obtained in Experiment II as shown in Figure 1. The pill group showed worse hearing than the nonpill group in the middle range and better hearing at the upper frequencies. Though not significant, the results from Experiments I and III tend to verify the better hearing for the pill group at the higher frequencies.

Figure 1



The mean hearing thresholds for the four menstrual phases for the women's groups and a matched set of means for the men are shown in Table 4. The interaction between groups and phases was not significant. The primary reason for showing these data is to point out that none of the means obtained differed by more than the 5-7 dB range which is considered normal error in the measurement of auditory thresholds.

Table 4

HEARING THRESHOLDS

EXPERIMENTS I & II COMBINED

MEAN THRESHOLDS OVER MENSTRUAL PHASES

GROUP	CYCLE WEEK MID CYCLE (X-2)	PRE MENSES (X-1)	MENSES (X)	POST MENSES (X+1)
MALES	33.0	32.5	32.3	32.8
FEMALES NON-PILL	31.4	31.0	30.5	30.2
FEMALES PILL	30.9	30.3	28.4	28.8

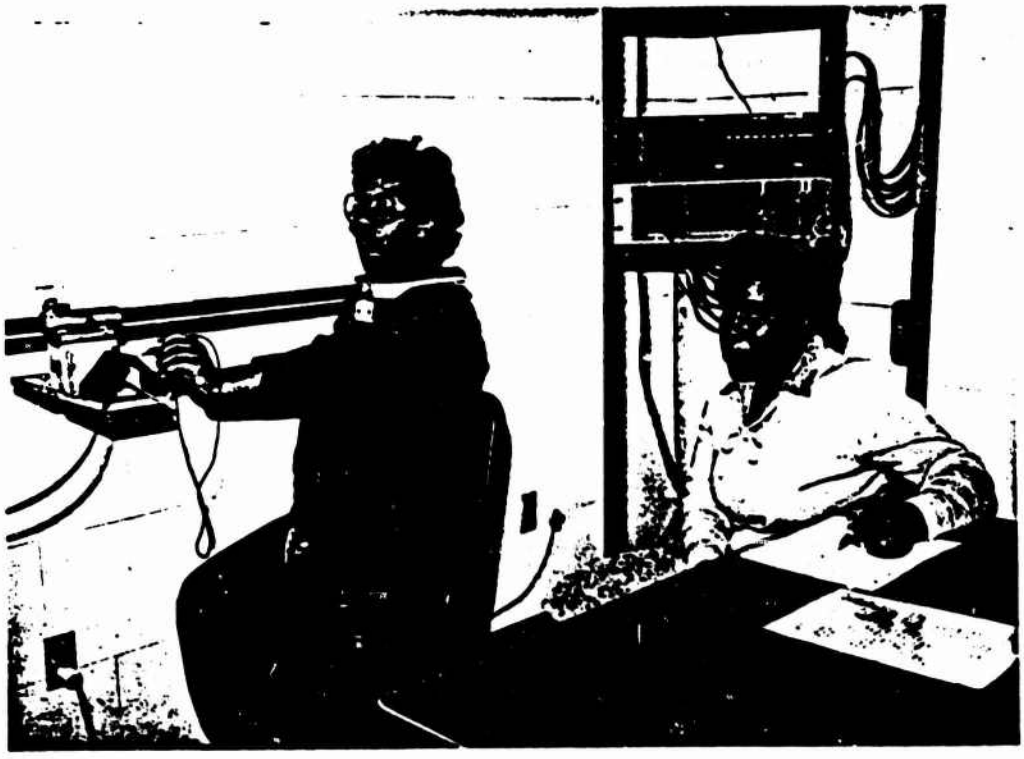
In a fourth experiment we tested the hearing thresholds of 11 women in a nonpill group for a complete cycle. Preliminary examination of the data from this experiment also shows no threshold shifts relating to phase of the cycle.

Experiments on Hand Steadiness

Our next series of experiments involved tests of hand steadiness which interested us because of large sex differences reported in the literature (e.g., Edwards, 1948) and because of several possible military applications.

In this task (Figure 2) the subjects were asked to hold a pencil-like stylus in each of 9 holes ranging in size from 3 to 13 mm. The number of times the side of the hole was touched in a 20-sec trial was recorded automatically.

Figure 2



The experimental designs (Table 5) for the hand-steadiness experiments were similar to those for auditory thresholds. In some cases, the subjects were the same as those used in the threshold experiments. In Experiment III no pill group was tested. Repeated measures were obtained in Experiment I and III. Only in Experiment I was adequate data obtained for analysis of a possible menstrual effect. Both preferred and nonpreferred hands were tested in Experiment II. Only the preferred hand was tested in Experiments I and III.

Table 5

HAND-STEADINESS EXPERIMENTS

Experiment	Subject Groups	Test Sessions	Menstrual Cycle Phase	Holes	Test Hand
I	1. Males 2. Females Pill 3. Females Non-Pill	Weeks 1-6 (to 8) (once/week)	Midcycle (X-2) Pre Menses (X-1) Menses (X) Post Menses (X+1)	1-9	Preferred Only
II	1. Males 2. Females Pill 3. Females Non-Pill	One Only	---	1-9	1. Preferred 2. Non-Preferred
III	1. Males 2. Females Non-Pill	1. First Week Day 1 2. First Week Day 2 3. Second Week Day 1 4. Second Week Day 2	---	4-9	Preferred Only

The results from Experiments I and II (Table 6) showed that the nonpill group of women was the steadiest and that the pill group performed more like the men.

Table 6

HAND STEADINESS

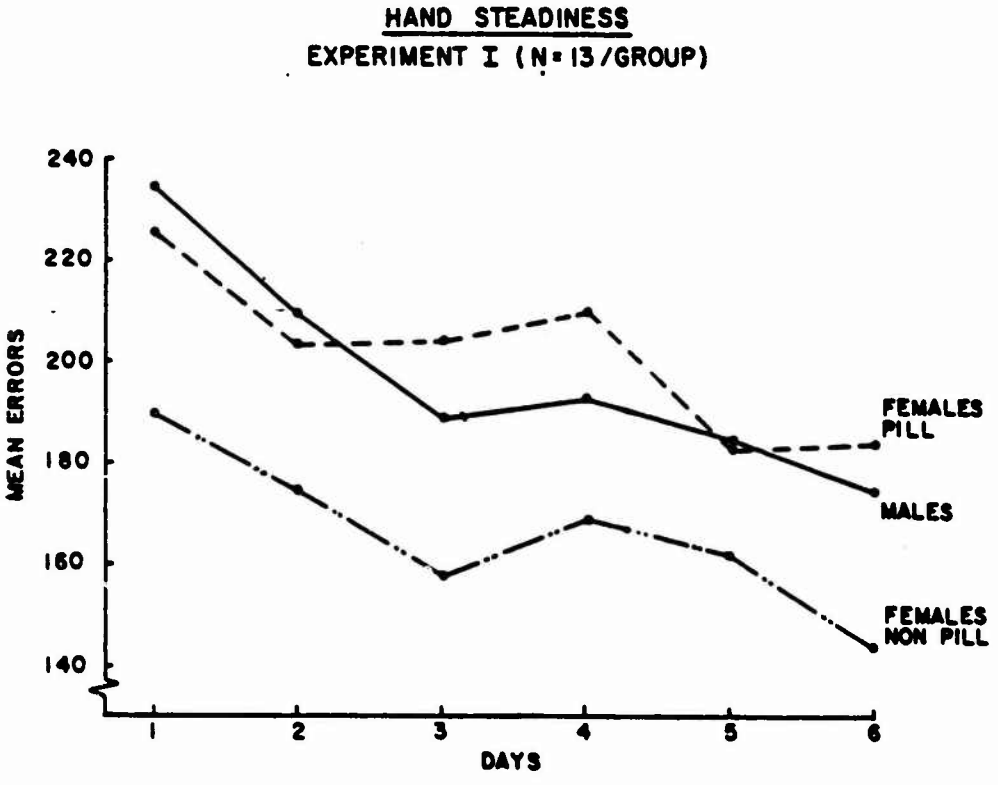
EXPERIMENTS I AND II

MEAN TOTAL ERRORS (HOLES 1-9) AT INITIAL TESTING

GROUP	EXPERIMENT I	EXPERIMENT II
MALES (N/GRP)	233 (18)	150 (33)
FEMALES NON-PILL	203 (16)	97 (24)
FEMALES PILL	226 (13)	122 (5)

This effect is shown even more dramatically in Figure 3 for Experiment I where the group differences were maintained over the 6 weeks of testing.

Figure 3



In Experiment III (Figure 4) the difference between the men and the nonpill group was not large initially, but quickly became quite apparent. Under the conditions of this experiment the men did not show the usual improvement over test days that the women did.

Figure 4

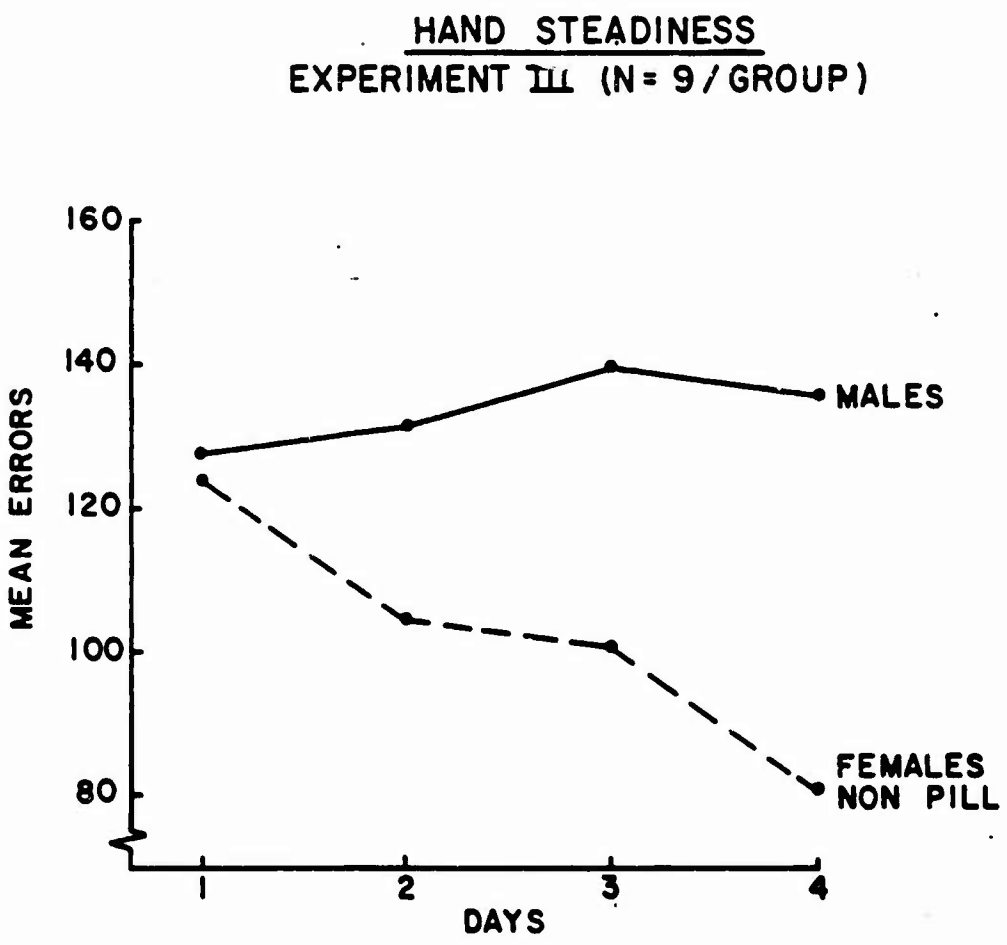


Table 7 shows the relative performance scores of the subject groups for each hand tested in Experiment II. All groups performed better with the preferred than the nonpreferred hand. The superiority of the nonpill group over the men is quite clear here. They did better with the nonpreferred hand than the men did with the preferred hand.

Table 7

HAND STEADINESS

EXPERIMENT II

MEAN TOTAL ERRORS (HOLES 1-9) FOR BOTH HANDS

GROUP	HAND	
	PREFERRED	NON-PREFERRED
MALES	150	182
FEMALES NON-PILL	98	138
FEMALES PILL	124	171

As in the experiments on hearing thresholds, we found no significant relationship between hand steadiness and phase of the menstrual cycle.

Experiments on Risk-Taking Behavior

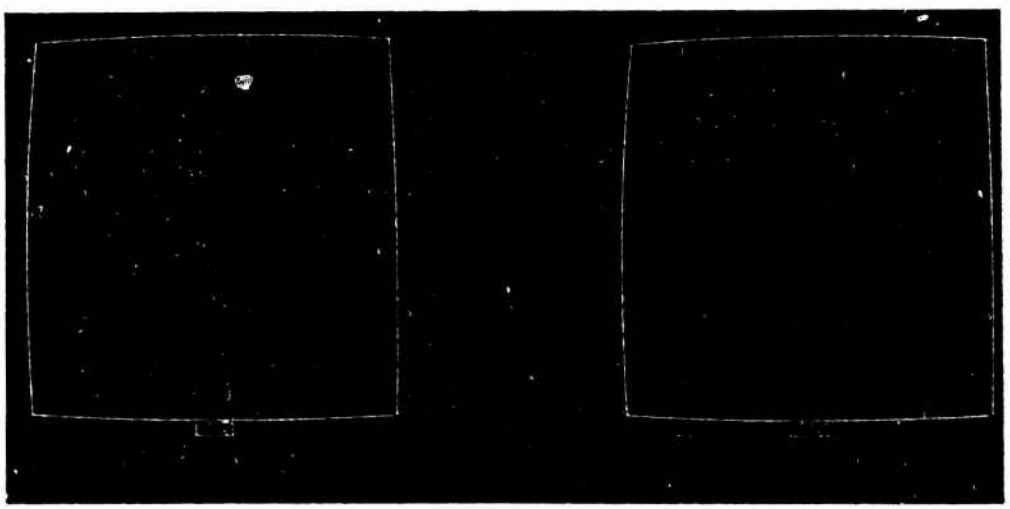
In the next series of experiments, we began our investigation of risk-taking behavior. Our interest in this area was sparked mainly by reports on driving behavior which have consistently demonstrated a more conservative attitude toward risk taking in women drivers (e.g., Ebbesen & Haney, 1973). Our initial efforts have involved attempts to test for sex differences in simplified computer simulations of military-related test situations requiring a degree of risk taking.

In the task shown in Figure 5, the subjects faced a screen displaying a simulated mine field with varying numbers and patterns of artillery-launched mines represented by dots in the field. The subjects were to decide whether or not to send a tank across the field based on their judgments of the chances of the tanks getting across successfully. Since the tank was not visible to the subject prior to their decision, and since it could start from any point along the bottom and proceed in a straight line through the field, the subject had only the number of mines and their patterns as bases for a decision. They could decide "go" or "no-go" and were given points or lost points based on the outcomes of their decisions. The score obtained and time-to-decision were recorded automatically for each trial.

Figure 5

Examples of two of the patterns used are shown in Figure 6. The pattern on the left is one with a .90 probability of successful crossing. The pattern on the right has a probability of .30 for successful crossing. Twenty such randomly generated patterns were displayed for each probability level used.

Figure 6



The experimental designs for the two risk-taking experiments conducted to date are shown in Table 8. The subject groups are males and females. Because the military population used for these experiments yielded very few women using birth control pills, we had to combine the pill and nonpill groups. Subjects were tested only once in Experiment I, but over 4 test days in Experiment II. In Experiment I, the subjects were given extensive practice estimating the actual probability levels for successful crossing of the mine field prior to starting the decision-making phase described above. No such practice was given in Experiment II. In Experiment II, the easiest 20 trials, those with a probability of .90 for success, were eliminated to make the task more difficult.

Table 8

RISK-TAKING EXPERIMENTS

Experiment	Subject Groups	Test Sessions	Probabilities of Success	Trials
I	1. Males (N=18) 2. Females (N=18)	1. Probability Estimating 2. Decision Making (1 & 2 Same Day)	.90 .70 .50 .30 .10	20/Level of Probability
II	1. Males (N=9) 2. Females (N=9)	1. Decision Making 2. Decision Making 3. Decision Making 4. Decision Making (2/Day; Weeks 1 & 2)	.70 .50 .30 .10	20/Level of Probability

The men and women did not differ significantly in their abilities to estimate probabilities of success in Phase I of Experiment I, or on their total scores for decision-making in either Experiments I or II.

However, as shown in Table 9, the women tended to take longer than men to make their decisions, particularly for the denser, more difficult levels. This difference was significant ($p<.025$) for those fields with mine densities allowing for a .30 probability of successful crossing.

Table 9

RISK TAKING

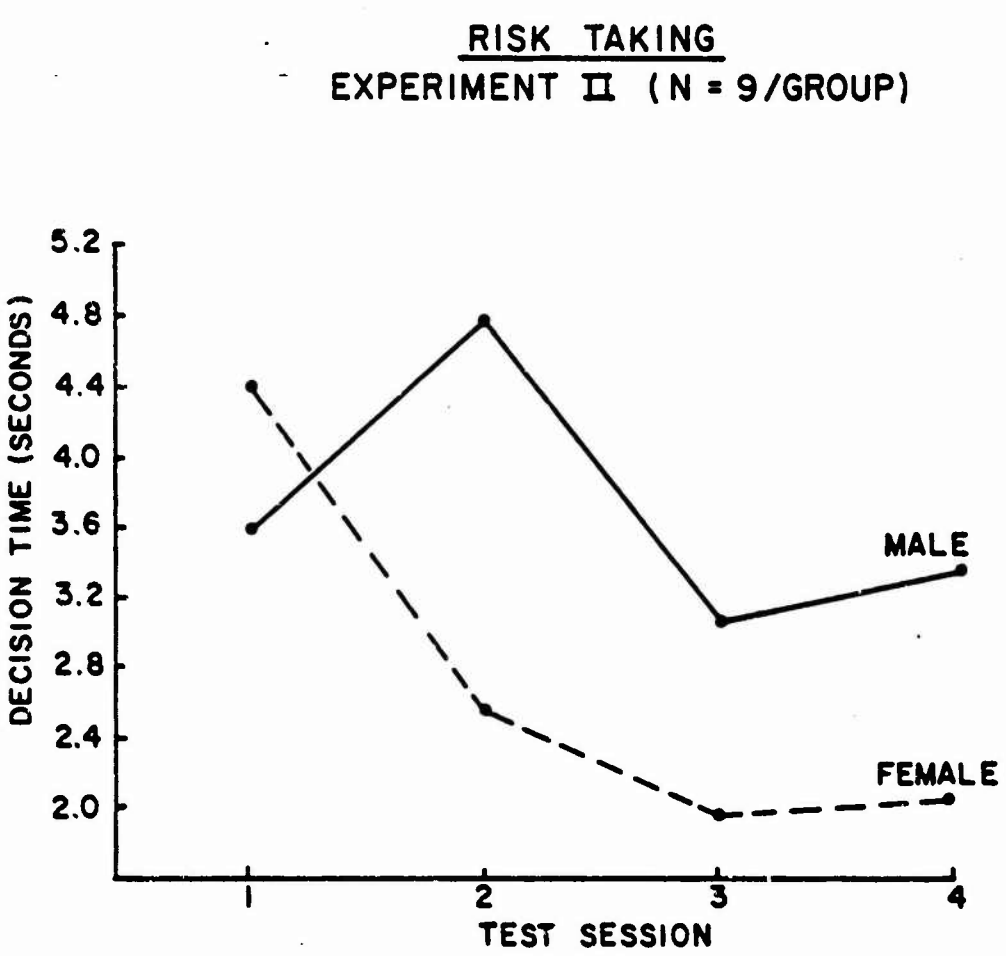
Experiment I Phase II

Mean Decision Making Time (Seconds)

Group		Probability of Success .90	.70	.50	.30	.10
Males	$\bar{X}$	1.59	1.84	2.54	2.56	1.67
	SD	.52	.62	.90	.87	.50
Females	$\bar{X}$	1.34	1.93	3.27	3.76	2.11
	SD	.46	.90	2.24	2.30	1.43

Figure 7 shows that in Experiment II, for the .30 probability density fields, a significant interaction occurred over test days. As in Experiment I, the women took longer than men to make their decisions on the first day of testing. However, on days 2-4 of testing, the women took significantly less time to make their decisions. The women appear to have reduced their response time, while the men did not, over the 4 test days. Although this interaction between sex and days was significant only for fields with .30 probability densities, similar patterns occurred for the other probability densities as well in Experiment II.

Figure 7



Summary and Conclusions

The major findings from our experiments in the areas of auditory thresholds, hand steadiness and risk taking are summarized in Table 10.

Table 10

SUMMARY/CONCLUSIONS

	Sex Differences	Menstrual Cycle Influence
Auditory Thresholds	Men had higher thresholds. Differences small; practical significance dubious.	No consistent influences found
Hand Steadiness	Non-Pill group significantly steadier than either men or Pill group. Pill group performed more like men than non-Pill group. Group differences persisted over several practice sessions.	No consistent influences found
Risk Taking	No significant differences in ability to estimate probabilities of success. No significant differences in total score for decision making. In low probability of success situations, women initially took significantly <u>longer</u> than men to make their decisions. In subsequent test sessions, women took significantly <u>less time</u> than men to make their decisions.	

Auditory Thresholds. Although our results show men to have somewhat higher auditory thresholds than women, the differences are small in absolute terms and are within the range of normal individual variation for clinical measurement. At least based on the frequencies tested, there appears to be no military application which would be significantly influenced by the small sex differences demonstrated in our experiments. Any potential application, however, which would involve audition at or above 8000 Hz should be cause for further investigation of possibly large and significant sex differences in hearing thresholds at the higher frequencies.

Hand Steadiness. Our future work in this area will likely involve investigations to determine whether or not the group differences we found are reflected in applied military situations such as the firing of hand-held weapons.

Risk Taking. These data clearly illustrate that one should be very cautious in drawing conclusions regarding male/female performance differences based solely on initial test trials. A very small amount of experience or training can have a dramatic effect on the relative performance of the groups.

Menstrual Influence. None of our findings to date even suggest any significant influence of menstrual factors on female performance. It should be noted, however, that our procedures for determining phases of cycles were dependent on subjects' reports of menstrual events as they remembered them, and that a great deal of variation exists with regard to menstrual cycle length and the timing of events within the cycles. Better estimates of cyclic events, possibly based on actual cyclic hormone levels, could reveal menstrual influences on performance, which might have been undetected in the present context.

If any important or meaningful sex differences in performance abilities are to be found, both the literature and the results of our research to date suggest they are not to be found in the simple, single-trial experiments most often reported. If they exist, it seems most likely that they will be revealed in experimental situations which involve the complexity of reality, repeated measures to overcome the effects of lack of experience or other transient or socially imposed factors, and stress which will test the limits of ability.

References

Diamond, M., Diamond, A. L., & Mast, M. Visual sensitivity and sexual arousal levels during the menstrual cycle. Journal of Nervous and Mental Disease, 1972, 155, 170-176.

Ebbesen, E. B., & Haney, M. Flirting with death: Variables affecting risk taking at intersections. Journal of Applied Social Psychology, 1973, 3, 303-324.

Edwards, A. S. Handedness and involuntary movement. Journal of General Psychology, 1948, 39, 293-295.

Hudgens, G. A., & Torsani-Fatkin, L. L. Human performance: Psychological and physiological sex differences (A selected bibliography). Aberdeen Proving Ground, MD: US Army Human Engineering Laboratory, February 1980.

McGuiness, D. Hearing: Individual differences in perceiving. Perception, 1972, 1, 465-473.

Semczuk, B., Przesmycka, S., & Pomykalski, M. [Changes of acoustic sensitivity during the menstrual cycle.] Polski Tygodnik Lekarski, 1967, 22, 586-588.

Torsani-Fatkin, L. L., & Hudgens, G. A. Human performance: Women in nontraditional occupations and the influence of the menstrual cycle (A selected bibliography). Aberdeen Proving Ground, MD: US Army Human Engineering Laboratory, May 1980.